UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

August 10, 2011

Mr. John Guth
Regional Manager, Air Quality Program
Pennsylvania Department of Environmental Protection
Northwest Regional Office
230 Chestnut Street
Meadville, PA 15222-4754

RE: Proposed Plan Approval for
Crawford Renewable Energy, LLC
Tire-derived fuel to energy project, Greenwood Township, Crawford County
Permit Number: PA-20-305A

Dear Mr. Guth:

Thank you for the opportunity to review the Commonwealth of Pennsylvania's proposed Plan Approval for Crawford Renewable Energy, LLC (CRE) new tire-derived fuel (TDF) to energy facility in Crawford County, Pennsylvania. Based on our evaluation, we have identified several comments that are included in the attachment. We provide these comments to help ensure that the project meets all federal requirements, that the permit provides all necessary information so that it is readily accessible to the public, and that the record provides adequate support for the permit decision.

If you have any questions, please do not hesitate to contact me at 215-814-2173 or Mr. Himanshu Vyas of my staff at 215-814-2112.

Sincerely yours,

Kathleen Cox
Associate Director,
Office of Permits and Air Toxics (3AP10)

Ec: Ed Orris, P.E. (PADEP)

Enclosure

Description of Project:

The proposed facility is a TDF-fired power generation facility with authorization to construct a 100 MW gross (90 MW net) power generation capacity. The facility will consist of two 50 MW circulating fluidized bed (CFB) steam generators each being controlled by a TurboSorp® scrubber, a fabric filter procured from Babcock Power Environmental, and a Regenerative Selective Catalytic Reduction (RSCR) unit for air pollution control. In addition, the facility will have a totally-enclosed TDF material handling operation; limestone, sand, and lime storage and handling; anhydrous ammonia handling; and bottom ash and fly ash handling. A firewater pump and direct contact cooling tower with drift eliminators will also be located at the facility.

Comments on Applicability:

1. The permit technical review memo (TRM) on page 12 states, "[t]he proposed facility will be a major source and will emit significant amounts, as defined in 40 CFR Part 52.21, for the following pollutants: CO and NO_x." However, we note that the potential to emit (PTE) for several other regulated NSR pollutants exceed their respective significant emission rates, meaning the facility triggers PSD requirements for not only NO_x and CO, but also emissions of SO_2, PM10 and PM2.5, sulfuric acid (H_2SO_4) mist, and greenhouse gases (GHG).

2. On page 11 of the TRM, the table labeled "Facility-wide Potential Emissions" lists NO_x emissions at 252.96 tons per year (tpy), but another table, reflecting emissions from only the CFB boilers, lists the NO_x emissions at 285.14 tpy. Please correct or explain this discrepancy.

Comments on the BACT/LAER:

3. On page 13, the TRM states that "CRE has chosen the most stringent technology available as shown in Section 5 of the application…A Summary of the results are listed below." As explained in more detail below, it appears that the most stringent control technology was not chosen for all pollutants evaluated for BACT. In such cases where a more effective technology was rejected as BACT, the TRM should provide the basis for selecting the less effective control technology (e.g., a cost effectiveness analysis or other rationale).

4. PADEP has proposed a wet slurry lime scrubber followed by low temperature fabric filter for control of SO_x, PM, HF, H_2SO_4 mist, HCl, Hg, and dioxin, and an RSCR located after the fabric filter for control of NO_x. In order to optimize the control efficiency of this control configuration, the source must vary the flue gas temperature, which may lead to additional energy use and emissions. We note that a multi-pollutant ceramic filter technology known by the trade name "UltraCat" was briefly considered and rejected by CRE in their BACT/LAER determination. UltraCat technology is commercially available through Tri-Mer Corporation, and we believe it would, for a similar cost, significantly lower the proposed facility's NO_x, PM, and SO_2 emissions as compared to the control configuration proposed by CRE. This is based on technical data specific to CRE's process conditions provided to EPA by Mr. Kevin Moss of Tri-Mer. Similarly, in the journal *Chemical Engineering* (January, 2009), A. Startin and G. Elliott of Clear Edge Filtration reported that low density ceramic filters are well suited for high temperature processes that are subject to stringent

emission limits. Below, we briefly describe the UltraCat technology and the relative emissions control compared to the limits proposed by CRE.

a. For NO_x emissions, the UltraCat ceramic filters have selective catalytic reduction (SCR) nanobits embedded in the walls of the filter. Ammonia reacts with the NO_x in the flue gas in the presence of the catalyst to produce water vapor and nitrogen. With operations at 525F, the UltraCat filters reduce NO_x emissions by 90%. Consequently, we would expect using UltraCat on the proposed CFB boilers would result in a NO_x emissions limit of 0.020 lbs/MMBTU, and annual NO_x emissions of 92 tpy. This is considerably lower than the draft permit for CRE, which cites a NO_x emission limit of 0.055 lbs/MMBTU with annual NO_x emissions of 252 tpy.

b. For PM emissions, the Tri-Mer Corporation guarantees performance of total filterable PM (PM10 and PM2.5) at 6.0 mg/Nm3, which translates to an emissions limit of 0.004 lbs/MMBTU and annual emissions of 18.4 tpy from the CFB boilers. These PM emissions are considerably lower than CRE's draft permit limit of 92 tpy utilizing the TurboSorp scrubber and fabric filter baghouse in series.

c. For SO_2 emissions, the UltraCat system features dry injection of sodium bicarbonate sorbent for capture of acid gases. Tri-Mer Corporation provides a guarantee of 0.024 lbs/MMBTU, providing annual emissions of 110 tpy SO_2. This compares favorably to the proposed permit limit of 143 tpy.

d. Similarly, UltraCat technology achieves better levels of control for HCl, Mercury, and dioxins.

The above comparisons of criteria pollutants emissions show that the UltraCat technology exceeds the levels of control achieved by the control technologies proposed by CRE. There may be reasons why this technology does not represent BACT/LAER for this facility, but the TRM does not articulate them. Since it is unclear why CRE rejected this technology in its application, we recommend that the UltraCat technology be fully evaluated in the BACT/LAER analyses for this facility. As part of our comments, we are providing reference materials for the forgoing technical details, in order to assist you in making your BACT/LAER determination.

5. On page 14 of the TRM, under "CFB BACT for SO_x" there is a table of control technologies. These technologies include combustion and post-combustion technologies for SO_2 control. However, in the next table, which is a summary of the technically feasible technologies, only the reductions in NO_x emissions are listed. Should this have been SO_2 reductions? Please explain or correct this discrepancy.

6. On page 15 of the TRM, a number of technologies are listed for CO BACT. However, the table that follows only shows the emissions reductions that result from boiler design. We note that both catalytic oxidation and thermal oxidation are potential control technologies that are able to achieve CO emission reductions. Please revise the BACT analysis to include consideration of catalytic oxidation and thermal oxidation.

7. On page 15 of the TRM, there is a section titled "CFB BACT and LAER for VOC." From our understanding, the proposed project is not a major source for VOC. Please clarify the purpose of this section.

8. On page 16 of the TRM, there is an analysis of CFB BACT for H_2SO_4 mist and condensable PM. However, similar to the SO_2 analysis above, the emission reductions are expressed as reductions of NO_x. Please explain or correct this discrepancy.

9. The draft plan approval requires a continuous particulate matter monitor for the CFBs. Please clarify that the CEMS is only for demonstrating compliance with the PM limit and not for demonstrating compliance with the PM10 or PM2.5 limits. Please also clarify what monitoring will be required for PM10 and PM2.5 emissions (e.g., parametric monitoring).

Comments on the GHG BACT:

10. On Page 3 of CRE's BACT analysis, the CO_2 emissions for the proposed facility are estimated based on the approximate carbon content of the TDF and the amount of unburned carbon in a "typical" CFB operation. However, most of the data presented by CRE relate to the combustion of coal. According to CRE's analysis, the selected boiler vendor has experience with burning TDF in CFB boilers. We recommend that the vendor's emissions data relating to combusting TDF, or other data from existing facilities, be included in the record to support the proposed GHG BACT emission limits.

11. The BACT analysis does not appear to consider GHG emissions from the combustion of natural gas during start-up. Since BACT must be met at all times, including periods of start-up, shutdown and malfunction, please revise the analysis to include these emissions.

12. The BACT analysis does not appear to consider GHG emissions from the fire pump and emergency generators. Please revise the BACT analysis to address the emissions from these additional combustion units.

13. The draft permit contains "carbon neutral" limits that rely upon the EPA's biomass deferral rule for CO_2 emissions. However, since CRE is proposing to use a Continuous Emission Monitoring System (CEMS) for CO_2, which will not differentiate between biomass combusted CO_2 and non-biomass combusted CO_2, these limits do not appear to be enforceable as a practical matter. Please explain how the biomass fraction of the fuel will be adjusted, or otherwise accounted for, with the data from the CO_2 CEMS to ensure that the BACT limit is enforceable as a practical matter.

14. The UltraCat ceramic filter technology identified earlier in this comment letter is purported to have a positive impact on the energy efficiency of the CFB combustion process. Therefore, we recommend that the BACT analysis for GHG be revised to evaluate UltraCat as a potential control option.

15. It appears that the "Emission Standard Value" of 0.99516 short tons/MW-hr listed on page 29 of the draft plan approval (under "CO_2 CEMS Requirements") is based on total GHG emissions. However, as you are aware, non-CO_2 GHG emissions will not be measured by the CO_2 CEMS. Since CO_2 is the predominant GHG for the proposed source, EPA recommends that the CO_2 CEMS be installed on both CFB boilers #1 and # 2 to monitor the CO_2 emissions, and that appropriate fuel factors (or other reliable strategy) be used to account for any non-CO_2 GHGs in order to create a BACT limit

expressed as CO_2e. EPA further recommends using the appropriate emission factors for calculating GHG emissions that will not be captured by the CEMS, such as GHG emissions from the generators and fire pump.

Comments on the Air Quality Analysis:

16. PADEP's air quality modeling analysis relies upon EPA's 1-hr NO_2 and SO_2 Interim SILs, which have specific record requirements. These requirements are explained in http://www.epa.gov/region7/air/nsr/nsrmemos/appwso2.pdf (for SO_2) and http://www.epa.gov/nsr/documents/20100629no2guidance.pdf (for NO_2). It is unclear from the draft permit and analysis whether PADEP followed the specific record requirements. Please ensure that these requirements have been followed.

17. Table 3A in PADEP's air quality modeling analysis summary lists the cooling tower stack height as 22.1 meters. We note that the modeling files list the stack height for these towers as 19.81 meters. Please clarify the proper stack height for the cooling towers.